

## REMARKS

In the Office Action dated October 8, 2003, claim 1 was objected to because the Examiner stated claim 1 should include an indication as to from where the electrical signals are supplied to the external measuring and evaluation unit. Claim 1 has been editorially amended to make clear that these signals are supplied from the hearing aid to the external measuring and evaluation unit.

Claims 1 and 6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sigwanz et al. in view of Ishige et al., further in view of Sasada. Claims 2-5 and 7-10 were stated to be allowable if rewritten in independent form.

For the reasons discussed below, Applicants respectfully traverse the rejection of claims 1 and 6, and therefore claims 2-5 and 7-10 had been retained in dependent form at this time.

In the method and apparatus disclosed and claimed in the present application, a hearing aid having a microphone arrangement with a directional characteristic is subjected to incoming acoustic signals from various directions, while the hearing aid is being worn by a hearing aid user. The electrical signals from the respective microphones resulting from the incoming acoustic signals are supplied to an external unit, i.e., a unit that is external to the worn hearing aid. In this external unit, the directional characteristic is optimized with respect to a predetermined (ideal) directional characteristic, by determining suitable filter parameters for filters in the hearing aid, which cause at least one of the amplitude response and the phase response of the filters to be adjusted. The filter parameters are then supplied back to the hearing aid and the filters are set accordingly, so that the actual directional

characteristic of the microphone arrangement in the hearing aid approximates, as closely as possible, the desired directional characteristic.

In the Sigwanz et al. reference, a method and a hearing aid are disclosed for setting a variable directional characteristic. To set the directional characteristic, the microphone signal is delayed by an adjustable amount of time in at least one microphone signal path. By adjusting this time delay, the direction of the highest sensitivity of the microphone system can be set approximately continuously (i.e., without steps) within a plane. In the Sigwanz et al. system, signal analysis is used to obtain information about the current sound and noise situation, and a directional characteristic, that is predetermined for this particular auditory situation, is then set. In the Sigwanz et al. system and method, however, there is no check that is undertaken to determine whether the directional characteristic that has been set is really the desired directional characteristic, as occurs in an actually worn hearing aid device, and taking into account other factors such as component tolerances. In the Sigwanz et al. system and method, although a signal analysis and a determination are undertaken, these are purely "theoretical" calculations based on stored parameters and programs, and do not necessarily reflect the actual hearing environment of a hearing aid being worn by a user.

As described in the present specification in the paragraph bridging pages 5 and 6, the measured directionality of a hearing aid will usually differ significantly from the desired or ideal directional pattern, this being caused by a number of factors that can be accurately taken into account only while the user is actually wearing the hearing aid. In the method and hearing aid disclosed and claimed in the present application, these factors can be and are taken into account, by sending the actual

microphone signals from a hearing aid being worn by a hearing aid user to the aforementioned external unit. The signals that are evaluated in the external unit in order to optimize the directional characteristic of the hearing aid thus represent "real" signals that take into account all of the factors that previously had to be mathematically modeled, or simply ignored. These factors include the shape of the head of the hearing aid user, the actual orientation of the hearing aids in or at the ear of the hearing aid user, component tolerances, etc.

It is correct that the Ishige et al. reference teaches the use of an external unit in connection with a hearing aid device, however, the external unit disclosed in the Ishige et al. reference does not determine the actual directional characteristic of a hearing aid device being worn at the head of a user, nor is there any calculation of parameters in that external device to optimize a measured directional characteristic with respect to a desired directional characteristic, as disclosed and claimed in the present application.

Therefore, even if the Sigwanz et al. hearing aid were modified were in accordance with the teachings of Ishige et al., neither a method as set forth in claim 1 nor a hearing aid arrangement as in claim 6 would result.

The Sasada reference discloses a feedback compensator wherein filter parameters are adaptively adjusted with a regulation circuit. There is no teaching or suggestion in this reference that the filter parameters that are adaptively adjusted in the Sasada reference have anything whatsoever to do with setting the directional characteristic of a microphone arrangement of a hearing aid device.

Applicants respectfully submit the Examiner, after reviewing the present claims, has merely located disparate and unrelated teachings in the prior art of a

hearing aid system wherein a directional characteristic can be adjusted (Sigwanz et al.) and a hearing aid system having an external unit (Ishige et al.) and a filter coefficient adjustment unit (Sasada). The Examiner has not provided any persuasive reasoning as to why a person of ordinary skill in the art would be motivated to combine these different and unrelated teachings. There is no linking teaching in the references cited by the Examiner, and the Examiner has not provided any persuasive reasoning as to why a person of ordinary skill in the art allegedly would be motivated to modify the Sigwanz et al. reference in accordance with the teachings of Ishige et al. and Sasada. As noted above, the use of an external unit has occurred to the present inventors based on a recognition of certain deficiencies associated with conventional ways of setting the directional characteristic of a hearing aid. Without recognizing these deficiencies, and recognizing that the use of an external unit allows a "real" measurement of the directional characteristic to be made and then optimized, there is no point to even using an external unit. In the Sigwanz et al. reference, for example, it is assumed that the directional characteristic thereof can be set without the use of any external unit. The Examiner has not provided any persuasive reasoning as to why a person of ordinary skill in the art allegedly would be motivated to use an external unit for setting the directional characteristic of a hearing aid, simply because the Ishige et al. reference happens to make use of an external unit for other purposes.

Claims 1 and 6 are therefore submitted to be in condition for allowance, and  
early reconsideration of the application is respectfully requested.

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